APPENDIX C

VERIFICATION REPORTING FORM: ENERGY-EFFICIENCY PROJECTS

The Verification Reporting Form is to be used for verifying the measured impacts of energy-efficiency projects as reported in the Monitoring and Evaluation Form (Appendix B). There are four main sections in this form.

Verification refers to establishing whether the measured GHG reductions actually occurred, similar to an accounting audit performed by an objective, certified party. External (third-party) verification processes need to be put in place and not rely on internal verification or audits. As part of the verification exercise, an overall assessment of the quality and completeness of each of the GHG impact estimates needs to be made by completing the Verification Reporting Form, similar to the Monitoring and Evaluation Reporting Form. For energy-efficiency projects, verifying baseline and post-project conditions may involve research studies, surveys, or other assessments (see Section 4.2), as well as requesting documentation on key aspects of the project. At a minimum, the verifier should ask the following general questions:

❑	Are the monitoring and evaluation methods well documented and reproducible?
❑	Have the results been checked against other methods?
❑	Have the results been compared for reasonableness with outside or independently published estimates?
❑	Are the sources of emission factors well documented?
❑	Have the sources of emission factors been compared with other sources?
❑	Are there any environmental or socioeconomic impacts that need to be evaluated in more detail?

In **Section A** (Project Description), the verifier provides the following information: the title of the project, contact information on the principal project developer, and a brief description of the project. If multiple participants are involved in the project, then these people should be listed. Much of this information will be identical to the information contained in the Monitoring and Evaluation Reporting Form (Appendix B) and, therefore, the relevant fields are shaded.

In **Section B** (Energy Use and Carbon Emissions), the verifier first provides information on the re-estimated baseline, measured gross energy use due to the project, and measured net energy use and carbon emissions (primarily drawn from the Monitoring and Evaluation Reporting Form in Appendix B; these sections are shaded). The verifier then provides information on a verified

baseline, verified gross energy use due to the project, and verified net energy use and carbon emissions. A comparison of the measured and verified impacts provides information on the performance and effectiveness of the project. If additional data collection and analysis was conducted, the verifier provides information on the data collection and analysis methods used for verifying changes in energy use and carbon emissions.

The verifier also needs to indicate whether key methodological issues were addressed for each method by responding to quality assurance guidelines. After indicating which monitoring and evaluation option of the International Performance Measurement and Verification Protocol was used, the verifier provide information on the data collection and analysis methods used for calculating net energy use and carbon emissions. The verifier describes how free riders, positive project spillover, and market transformation were verified, and compares these calculations with those measured during project implementation. If there are differences or discrepancies, the verifier needs to explain the inconsistencies. In the last part of Section B, the verifier provides information on the measurement and operational uncertainties affecting the project (including a description of a contingency plan). If there are differences or discrepancies with the information in the Monitoring and Evaluation Reporting Form, the verifier needs to explain the inconsistencies.

In **Section C** (Environmental Impacts), the verifier indicates, via a checklist, the types of environmental impacts affected by the project, the types of mitigation activities conducted, and consistency of the project with environmental laws and, if applicable, environmental impact statements. If there are differences or discrepancies with the information in the Monitoring and Evaluation Reporting Form, the verifier needs to explain the inconsistencies.

In **Section D** (Socioeconomic Impacts), the verifier indicates, via a checklist, the types of socioeconomic impacts affected by the project, and the types of mitigation activities conducted. If there are differences or discrepancies with the information in the Monitoring and Evaluation Reporting Form, the verifier needs to explain the inconsistencies.

A. PROJECT DESCRIPTION

[*Same as Reported in Monitoring and Evaluation Reporting Form*]

A1. Title of project:

A2. Principal project developer and contact:

Item	Please fill in if applicable
Name of principal project developer[1]:	
Name of project developer (English):	
Mailing address:	
Telephone:	
Fax:	
Contact person for this project:	
Mailing address:	
Telephone:	
Fax:	
Email:	

[1]If multiple participants are involved in the project, then they need to assign one of the participants as the "principal project developer" to complete this form. Other participants are not allowed to report on the impacts of this specific project, to avoid multiple reporting.

A3. Other participants

List other participants:

A4. Project Description

Briefly describe the project:

B. ENERGY USE AND CARBON EMISSIONS

B1. Re-estimated Energy Use and Carbon Emissions in Baseline Emissions [Same as Reported in Section B4 in Monitoring and Evaluation Reporting Form]

Re-estimate annual energy use and carbon emissions (1) for the unadjusted baseline (without free riders), (2) free riders, and (3) for the baseline (adjusted for free riders). Indicate the level of precision for each value.

Re-estimated	Unadjusted Baseline (1)	Level of Precision[a]	Free Riders (2)	Level of Precision[a]	Without - Project Baseline (3=1-2)	Level of Precision[a]
On-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.)						
On-site electricity use (MWh/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.)						
Off-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.) [c]						
On-site electricity use (MWh/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.) [c]						
TOTAL Carbon emissions (tC/yr.)						

[a] Indicate the level of precision used for project values: use either (1) standard deviation around the mean value, or (2) general level of precision (e.g., low, medium, high) — if more information is available, additional levels of precision can be used.

[b] Specify type of fuel used for calculating carbon emissions factor.

[c] Indicate carbon reductions from off-site electric utility plant(s).

B2. Measured Gross Changes in Energy Use and Carbon Emissions from Project [Emissions [*Same as Reported in Section B5 in Monitoring and Evaluation Reporting Form*]

Measure annual energy use and carbon emissions (1) for the unadjusted project, (2) from positive project spillover, (3) from market transformation, and (4) for the "with-project" scenario. Indicate the level of precision for each value.

Measured	Unadjusted With Project (1)	Positive Project Spillover (2)	Market Transformation (3)	With-Project (4=1+2+3)
On-site fuel use (Terajoules = 10^{12} joules/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.)				
On-site electricity use (MWh/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.)				
Off-site fuel use (Terajoules = 10^{12} joules/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.) [c]				
Off-site electricity use (MWh/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.) [c]				
TOTAL Carbon emissions (tC/yr.)				

[a] Indicate the level of precision used for project values: use either (1) standard deviation around the mean value, or (2) general level of precision (e.g., low, medium, high) — if more information is available, additional levels of precision can be used.

[b] Specify type of fuel used for calculating carbon emissions factor.

[c] Indicate carbon reductions from off-site electric utility plant(s).

B3. Measured Net Changes in Energy Use and Carbon Emissions from Project [*Same as Reported in Section B6 in Monitoring and Evaluation Reporting Form*]

Calculate the net change in annual energy use and carbon emissions by subtracting "with-project" values (taken from Table B2) from "without-project baseline" values (taken from Table B1). Indicate the level of precision for each value.

Measured	Without-Project Baseline (1)	Level of Precision[a]	With-Project (2)	Level of Precision[a]	Net Change in Energy Use and Emissions (3=1-2)	Level of Precision[a]
On-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.)						
On-site electricity use (MWh/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.)						
Off-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.) [c]						
Off-site electricity use (MWh/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.) [c]						
TOTAL **Carbon emissions (tC/yr.)**						

[a] Indicate the level of precision used for project values: use either (1) standard deviation around the mean value, or (2) general level of precision (e.g., low, medium, high) — if more information is available, additional levels of precision can be used.

[b] Specify type of fuel used for calculating carbon emissions factor.

[c] Indicate carbon reductions from off-site electric utility plant(s).

B4. Verified Energy Use and Carbon Emissions in Baseline Emissions [*to be completed by verifier*]

Verify annual energy use and carbon emissions (1) for the unadjusted baseline (without free riders), (2) free riders, and (3) for the baseline (adjusted for free riders). Indicate the level of precision for each value.

Verified	Unadjusted Baseline (1)	Level of Precision[a]	Free Riders (2)	Level of Precision[a]	Without - Project Baseline (3=1-2)	Level of Precision[a]
On-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.)						
On-site electricity use (MWh/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.)						
Off-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.) [c]						
Off-site electricity use (MWh/yr.)						
Carbon emissions factor [b] Type of fuel:						
Carbon emissions (tC/yr.) [c]						
TOTAL Carbon emissions (tC/yr.)						

[a] Indicate the level of precision used for project values: use either (1) standard deviation around the mean value, or (2) general level of precision (e.g., low, medium, high) — if more information is available, additional levels of precision can be used.

[b] Specify type of fuel used for calculating carbon emissions factor.

[c] Indicate carbon reductions from off-site electric utility plant(s).

B5. Verified Gross Changes in Energy Use and Carbon Emissions from Project [*to be completed by verifier*]

Verify annual energy use and carbon emissions (1) for the unadjusted project, (2) from positive project spillover, (3) from market transformation, and (4) for the "with-project" scenario. Indicate the level of precision for each value.

Verified	Unadjusted With Project (1)	Positive Project Spillover (2)	Market Transformation (3)	With-Project (4=1+2+3)
On-site fuel use (Terajoules = 10^{12} joules/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.)				
On-site electricity use (MWh/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.)				
Off-site fuel use (Terajoules = 10^{12} joules/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.) [c]				
Off-site Electricity use (MWh/yr.)				
Carbon emissions factor [b] **Type of fuel:**				
Carbon emissions (tC/yr.) [c]				
TOTAL **Carbon emissions (tC/yr.)**				

[a] Indicate the level of precision used for project values: use either (1) standard deviation around the mean value, or (2) general level of precision (e.g., low, medium, high) — if more information is available, additional levels of precision can be used.

[b] Specify type of fuel used for calculating carbon emissions factor.

[c] Indicate carbon reductions from off-site electric utility plant(s).

B6. Verified Net Changes in Energy Use and Carbon Emissions from Project [*to be completed by verifier*]

Calculate the net change in annual energy use and carbon emissions by subtracting "with-project" values (taken from Table B5) from "without-project baseline" values (taken from Table B4). Indicate the level of precision for each value.

Measured	Without-Project Baseline (1)	Level of Precision[a]	With-Project (2)	Level of Precision[a]	Net Change in Energy Use and Emissions (3=1-2)	Level of Precision[a]
On-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.)						
On-site electricity use (MWh/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.)						
Off-site fuel use (Terajoules = 10^{12} joules/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.) [c]						
Off-site electricity use (MWh/yr.)						
Carbon emissions factor [b] **Type of fuel:**						
Carbon emissions (tC/yr.) [c]						
TOTAL **Carbon emissions (tC/yr.)**						

[a] Indicate the level of precision used for project values: use either (1) standard deviation around the mean value, or (2) general level of precision (e.g., low, medium, high) — if more information is available, additional levels of precision can be used.

[b] Specify type of fuel used for calculating carbon emissions factor.

[c] Indicate carbon reductions from off-site electric utility plant(s).

B7. Data Collection and Analysis Methods [Only to be completed by verifier if additional data collection and analysis were conducted as part of verification]

B7.1. Check one or more of the following data collection and analysis methods used for calculating energy savings:

❑	Engineering methods
❑	Basic statistical models
❑	Multivariate statistical models
❑	End-use metering
❑	Short-term monitoring
❑	Integrative methods

B8. Quality Assurance Guidelines (*to be completed by verifier*)

The Quality Assurance Guidelines (QAG) are contained in six tables, one table for each data collection and analysis method. Check the box to indicate that these issues were addressed. If not addressed, or if there were problems, discuss on a separate sheet for each table.

Table QAG-1	**Quality assurance guidelines for engineering methods**	
Data	❑	1. Was the data collection process described that supported the analysis?
	❑	2. Were the source(s) and method(s) of collecting these data described?
	❑	3. Were data identified by source: site inspection, building plans, default values, or other sources of data?
	❑	4. Were the loads, systems, and plants components of the model specified?
Calibration	❑	1. Were the models calibrated to observed data on usage levels?
	❑	2. Were criteria used to judge whether the model was appropriately calibrated described?
	❑	3. Were the input values that were changed to bring the simulation into calibration described? And were reasons given why a value was changed?
Weather	❑	Were the weather data chosen for the simulation described? And did the weather data correspond to the geographic location and climate conditions of the building?

Table QAG-2	Quality assurance guidelines for basic statistical models
Sampling	1. If a sample was used, describe the sample design (e.g., was a random sample used? proportional sample? cluster sample? stratified sample?). 2. Describe the size of the expected sample and achieved sample (e.g., how many questionnaires were mailed out and how many completed ones were returned?). 3. Describe the response rate for each of the major data collection efforts. 4. Describe any efforts to estimate the extent of non-response bias. 5. Describe any efforts to correct for non-response bias. 6. Describe any procedures used to determine the size of the samples in order to achieve a specific level of precision at a given level of confidence. 7. Describe any tests or comparisons made to examine whether the sample was representative of the population of participants (or comparison population). 8. If a stratified sample was used, describe how the strata were defined and how the allocation to strata was determined. 9. If the sample was weighted for analysis, describe the basis for the weighting.
Data	1. Describe the data that were collected to support the analysis. 2. Describe the source(s) and method(s) of collecting these data. 3. Describe the screens used to eliminate customers from the analysis and the number of customers eliminated as the result of each screen (where applicable). 4. Describe where data collection instruments can be found.
Outliers	If outliers were identified, describe how they were identified, how many there were, and how they were handled.
Missing data	Describe how missing data were handled.
Weather	1. Describe the weather normalization model used. 2. Describe the source of the weather data used for analysis. 3. Describe how weather normalization adjusted for heating degree-days only, cooling degree-days only, or both. 4. Describe the degree-day base used for heating and for cooling.
Comparison group	1. If a comparison group was not used to estimate gross savings, describe what was done to control for the effects of background variables (e.g., economic and political activity) that may account for any increase or decrease in consumption in addition to the project itself. 2. If a comparison group was used to estimate gross or net savings, describe how the group was defined and what, if anything, was done to control for differences between the comparison and participant groups and any suspected self-selection bias.

Table QAG-3	Quality assurance guidelines for multivariate statistical models
Sampling	See Table QAG-2.
Data	1. Describe the data that were collected to support the analysis. 2. Describe the source(s) and method(s) of collecting these data.
Specification and error	1. Describe any substantial errors in measuring important independent variables and how these errors were minimized. 2. If autocorrelation was a problem, describe the diagnosis carried out, the solutions attempted, and their effects. If left untreated, explain why. 3. If heteroskedasticity was a problem, describe the diagnosis carried out, the solutions attempted, and their effects. If left untreated, explain why.
Collinearity	If collinearity was a problem, describe the diagnosis carried out, the solutions attempted, and their effects. If left untreated, explain why.
Outliers	See Table QAG-2.
Missing data	See Table QAG-2.
Triangulation	If more than one estimate of impact is calculated, describe how the results have been combined to form a single estimate.
Weather	See Table QAG-2.
Engineering priors	If prior engineering estimates of usage or savings were used in the models, describe the source(s) of the priors.
Comparison group	See Table QAG-2.
Interactions	Describe how interaction effects (e.g., between heating and lighting) were addressed.

Table QAG-4	Quality assurance guidelines for end-use metering
Sampling	See Table QAG-2.
Data	See Table QAG-3.
Outliers	See Table QAG-2.
Missing data	See Table QAG-2.
Weather	See Table QAG-2.
Comparison group	See Table QAG-2.
Interactions	See Table QAG-3.
Measurement duration	Describe the duration and interval of the metering.

Table QAG-5	Quality assurance guidelines for short-term monitoring
Sampling	See Table QAG-2.
Data	See Table QAG-3.
Outliers	See Table QAG-2.
Missing data	See Table QAG-2.
Weather	See Table QAG-2.
Comparison group	See Table QAG-2.
Interactions	See Table QAG-3.
Measurement duration	Describe the duration and interval of the monitoring.

Table QAG-6	Quality assurance guidelines for integrative methods
Sampling	See Table QAG-2.
Data	See Table QAG-3.
Specification and error	See Table QAG-3
Collinearity	See Table QAG-3
Outliers	See Table QAG-2.
Missing data	See Table QAG-2.
Triangulation	See Table QAG-2.
Weather	See Tables QAG-1 and QAG-2.
Engineering priors	See Table QAG-2.
Comparison group	See Table QAG-2.
Calibration	See Table QAG-1.
Measurement duration	See Tables QAG-4 and QAG-5.
Interactions	See Table QAG-3.

B9. IPMVP Options [*Only to be completed by verifier if additional data collection and analysis were conducted as part of verification*]

B9.1. Describe which of the following options from the International Performance Measurement and Verification Protocol (IPMVP) were used (see Section 4.2.9 of report):

❑	Option A
❑	Option B
❑	Option C
❑	Option D

B10. Data Collection and Analysis Methods [*Only to be completed by verifier if additional data collection and analysis were conducted as part of verification*]

B10.1. Describe which of the following methods were used for calculating net energy savings:

❑	Default "net-to-gross" factors
❑	Project-estimated net-to-gross factors
❑	50% deduction of first-year savings

B11. Free Riders [*to be completed by verifier*]

B11.1. Describe how free ridership was evaluated, compare to measured free ridership, and explain inconsistencies:

B11.2. What methods were used to evaluate free ridership:

❑	Surveys
❑	Discrete choice modeling
❑	Multivariate statistical models

B12. Positive Project Spillover [*to be completed by verifier*]

B12.1. Describe how positive project spillover was evaluated, compare to measured spillover, and explain inconsistencies:

B12.2. What methods were used to evaluate positive project spillover:

❑	Surveys
❑	Discrete choice modeling
❑	Multivariate statistical models

B12.3. Evaluate the effectiveness of the project's plan that identifies potential positive project spillover and discusses options within the project to minimize, or account for, spillover:

B13. Market Transformation [*Only to be completed by verifier if additional data collection and analysis were conducted as part of verification*]

B13.1. Which of the following indicators were used to describe how the market has been transformed, or that the savings from the project are expected to persist? [Check all that may apply]

❑	Changes in government standards or regulations
❑	Physical changes in production or distribution practices that are not easily undone
❑	Institutional changes in standard practice
❑	New market entrants
❑	Profitable market entities continue the market transformation
❑	Key market barriers removed or reduced
❑	Market saturation of equipment

B13.2. Which of the following methods were used to evaluate market transformation? [Check all that may apply]

❑	Surveys
❑	Sales tracking
❑	Multivariate statistical models
❑	Modeling of market processes
❑	Econometric studies
❑	Process evaluations

B13.3. Compare verified changes from market transformation to measured changes from market transformation, and explain inconsistencies:

B14. Emissions [*Only to be completed by verifier if additional data collection and analysis were conducted as part of verification*]

B14.1. Which of the following methods were used for calculating carbon emissions:

❑	Default emissions factors
❑	Project-estimated emissions factors

B15. Uncertainty [*to be completed by verifier*]

B15.1. Identify and discuss key measurement and operational uncertainties affecting all energy and emission estimates. If there are differences or discrepancies with the information in the Monitoring and Evaluation Reporting Form, explain the inconsistencies.

Measurement Uncertainties: Operational Uncertainties:

B15.2. Describe the project's contingency plan that identifies potential project uncertainties and discusses the contingencies provided within the project estimates to manage the uncertainties.

Contingency plan:

B15.3. Assess the possibility of local or regional political and economic instability in the short-term (5 years or less) and how this may affect project performance.

Political and economic instabilities:

C. ENVIRONMENTAL IMPACTS

C1. Identify and check whether the project will have one or more environmental impacts and, where appropriate, describe the type of impact. If there are differences or discrepancies with the information in the Monitoring and Evaluation Reporting Form, explain the inconsistencies. [*to be completed by verifier*]

	Potential Environmental Impacts	
	Impact Category	**Comments**
❑	Dams and reservoirs*	Implementation and operation
❑	Effluents from power plants	Air, water and solid effluents from power plants
❑	Hazardous and toxic materials	Manufacture, use, transport, storage and disposal
❑	Indoor air quality	Measures to maintain and/or improve indoor air quality
❑	Industrial hazards	Prevention and management
❑	Insurance claims	Reduced losses in personal and commercial lines of coverage
❑	Occupational health and safety	Plans
❑	Water quality	Protection and enhancement
❑	Wildlife and habitat protection or enhancement	Protection and management

*Without project

C2. Identify any proposed mitigation activities. [*to be completed by verifier*]

Mitigation activities:

C3. Indicate whether an environmental impact statement (EIS) has been filed and that the response to the checklist of environmental impacts is consistent with the EIS. [*to be completed by verifier*]

❑	EIS filed
❑	EIS not filed
❑	Checklist consistent with EIS
❑	Checklist not consistent with EIS. Explain reasons:

C4. Indicate whether any environmental laws apply to these impacts and that the response to the checklist of environmental impacts is consistent with the environmental laws. [*to be completed by verifier*]

❑	Applicable environmental laws
❑	Checklist consistent with environmental laws
❑	Checklist not consistent with environmental laws. Explain reasons:

D. SOCIOECONOMIC IMPACTS

D1. Indicate whether the project will have one or more socioeconomic impacts and, where appropriate, describe the type of impact. [*to be completed by verifier*]

❑	Cultural properties (archeological sites, historic monuments, and historic settlements)
❑	Distribution of income and wealth
❑	Employment rights
❑	Gender equity
❑	Induced development and other sociocultural aspects (secondary growth of settlements and infrastructure)
❑	Long-term income opportunities for local populations (e.g., jobs)
❑	Public participation and capacity building
❑	Quality of life (local and regional)

D2. Identify any proposed mitigation activities. [*to be completed by verifier*]

Mitigation activities: